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Inking roller system adjustment method

FILED

Patent Number: DE19517154
Publication date: 1996-11-14
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Requested Patent: ☐ DE19517154
Application Number: DE19951017154 19950510
Priority Number(s): DE19951017154 19950510
IPC Classification: B41F33/00; B41F31/00; B41F31/12; B41F31/14; G01D15/00
EC Classification: B41F31/00, G01D15/16
Equivalents:

Abstract

The method involves feeding the printing ink before printing commences to printing rollers exclusively from the ink fountain through ink doctor zones controlling the required zonal flow of ink. The inking roller system has ink rollers (4), ink fountain (1), adjustable ink pump (6) and adjustable inking zones (3) which are controlled remotely or according to data transmitted from the printing plate. Before printing commences ink for a specific number of filling cycles is fed to the system or for a specific time. The speed of rotation of the ink doctor is set according to the printed material/printing ink combination.

(12) UK Patent Application (19) GB (11) 2 017 001 A

(21) Application No 7901046
(22) Date of filing 11 Jan 1979
(23) Claims filed 11 Jan 1979
(30) Priority data
(31) 2811276
(32) 15 Mar 1978
(33) Fed. Rep. of Germany (DE)
(43) Application published 3 OCT 1979
(51) INT CL² B41F 31/02
(52) Domestic classification B6C 1200 1230 1281 XQ
(58) Documents cited
GB 1472844
GB 1406927
IBM Technical Disclosure Bulletin
Vol. 16 No. 10 P. 3293
(March 1974)
(58) Field of search B6C

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(54) Device for the quantity-regulated supply of ink to a ductor cylinder of an offset printing machine

(57) A capacitive proximity switch (7) is used to detect the level of ink in an ink duct of a printing machine, and thus control the addition of regulated quantities of ink. The switch 7 is preferably placed so that it is associated with a region 6 which, in use, develops an upward swell due to operation of the machine. The regulated addition may be from a step-wise activated piston-and-cylinder device, preferably formed as a replaceable cartridge.

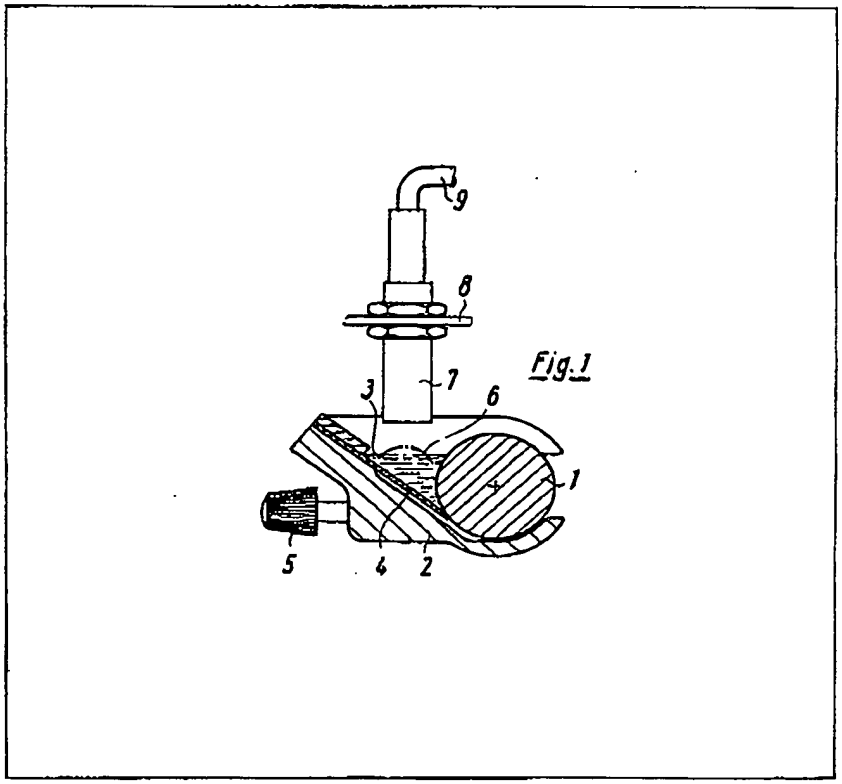

Fig.1

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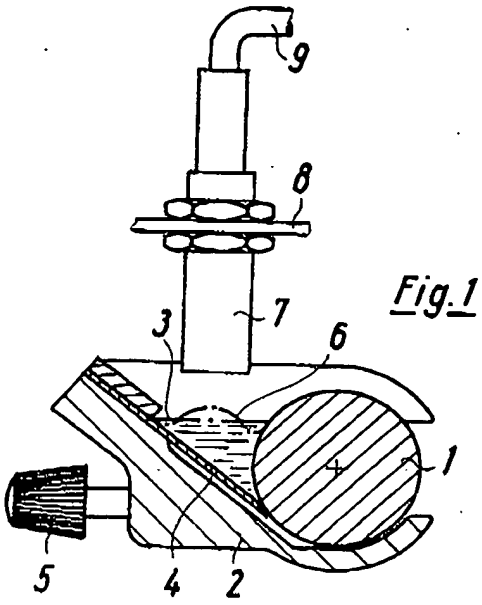
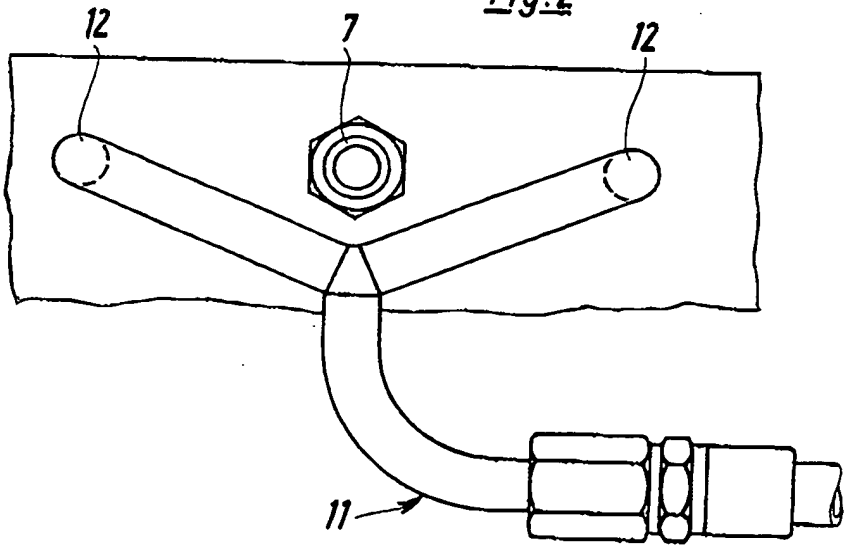


Fig.1

Fig.2



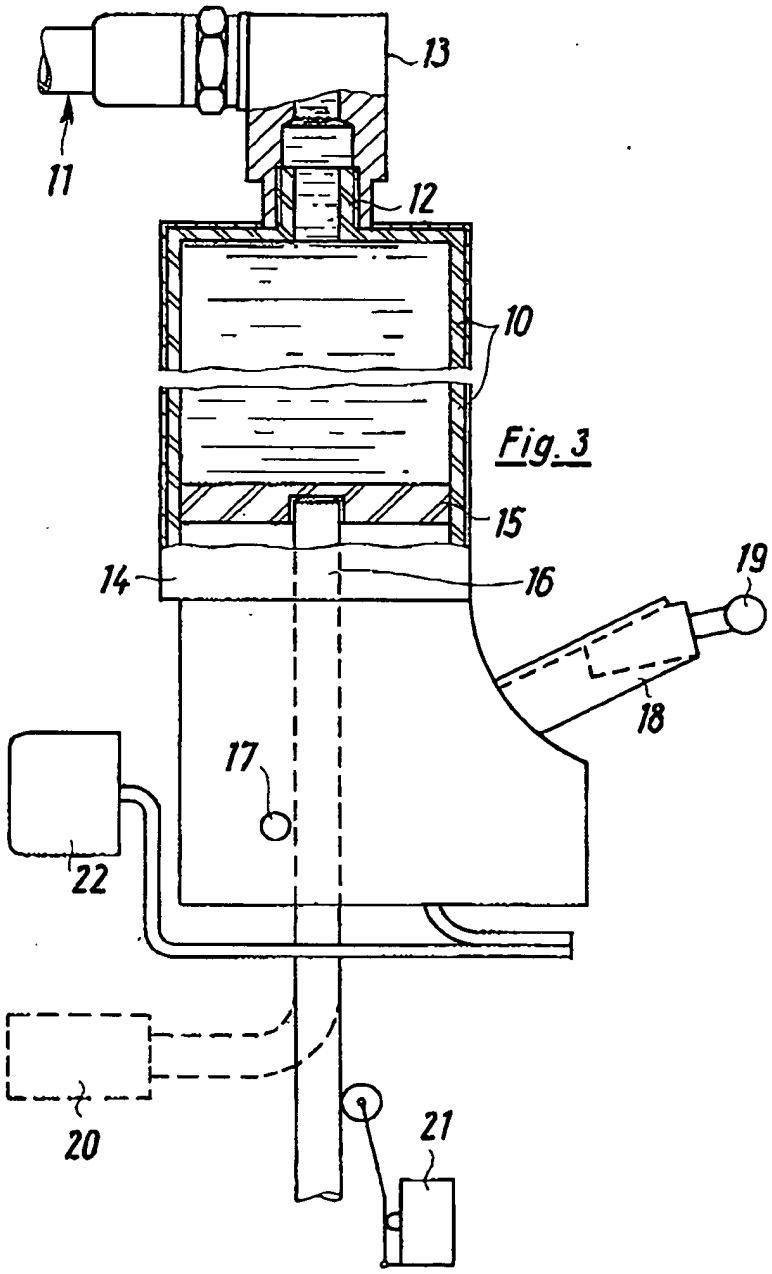


Fig. 3

SPECIFICATION

Device for the quantity-regulated supply of ink to a ductor cylinder of an offset printing machine

The invention relates to a device for the quantity-regulated supply of ink to a ductor cylinder of an offset printing machine which dips into an ink bath to which there is connected an apparatus for adding regulated quantities of ink, which apparatus is controlled by means of a distance sensor by an apparatus for monitoring the level of the ink bath.

The quantity-regulated addition of printing ink causes considerable difficulties in offset printing machines in practice. The reason for this consists primarily in that the printing ink on the one hand is relatively thickly liquid and possesses approximately the viscosity of honey and on the other hand is electrically non-conductive, so that electrically or inductively working measuring sensors cannot be used. In the case of large commercial offset printing machines it is known to monitor the level of the ink bath by means of a reflex pneumatic switch and to add ink when necessary in dependence upon the ascertained level. Such reflex pneumatic switches are relatively trouble-prone, since they can no longer operate if once they should dip into the ink bath. Especially the openings which receive the air reflex jet then block, so that the reflex pneumatic switch must first be cleaned if it is to be capable of functioning again. Moreover the pneumatic signal obtained from the reflex pneumatic switch must be converted into an electric signal before it can be used by the apparatus for the addition of the ink. Thus such devices become really costly, so that their use is too expensive and not reasonable in small offset printing appliances, especially in what are called office printers. Up to the present there is no device for quantity-regulated ink addition which is really capable of pratical function specifically for such small offset machines, so that the correct addition of ink is left laregly to the skill of the operator of this apparatus. In practice this leads to considerable difficulties, since offset printing apparatuses react very sensitively to over-dosage or ink starvation. Here it becomes especially unfavourably noticeable specifically in these apparatuses that the volume of the ink baths allocated to the ductor cylinders must be relatively slight in the small apparatuses, so that ink starvation can occur relatively quickly in larger runs.

The invention is based upon the problem of producing a device for the quantity-regulated supply of ink which on the one hand functions operationally reliably and on the other hand can be produced with low economic expense, so that it can be used even with small apparatuses.

According to the invention a capacitive proximity switch is provided as distance sensor.

Such a capacitive proximity switch is not dependent upon the electrical conductivity of the ink, so that it responds even in the case of the electrically non-conductiv printing ink. Moreover it is insusceptible to faults, especially since there is no harm to its perating capacity if it sh uld dip occasionally into the ink.

In advantageous development of the invention it is provided that the proximity switch is associated with a zone of the ink bath where an upward swell of the ink develops when the ductor cylinder is in rotation. It can be observed that an upward swell forms in the immediate vicinity of the ductor cylinder as soon as the latter is running. Especially in small apparatuses with correspondingly small volume of the ink bath, this upward swell leads to a great variation of level which is exploited in accordance with the development of the invention so that no incorrect dosage takes place.

In further expedient development of the invention it is provided that the proximity switch is arranged centrally between two ink supply nozzles which are arranged at a distance from one another which corresponds, at least approximately, to half of the length of the ductor cylinder. The use of two ink supply nozzles has the advantage that relatively large cross-sections can be used which are correspondingly insusceptible to blockage by drying up of the ink or the like. Drying up of the ink in the region of the ink supply nozzles can also be prevented in that the ink supply nozzles are so arranged that they practically always dip into the ink bath.

In order to produce the entire device with especially good value for money, in further development of the invention it is provided that as quantity-regulating pump there serves a replaceable cartridge which contains a piston which can be advanced step by step, by a predetermined distance each time, by means of an advancer device. The use of a cartridge has the advantage that the replenishment of the ink supply can be carried out, by replacement of the cartridge, very simply even by persons not specially trained, without the danger of the person concerned or the apparatus being soiled.

In order to provide an especially simple advancer device it is provided in further development of the invention that the advancer device comprises a piston rod which is held by means of a detent device, connectable with the piston of the cartridge and connected to an advancer drive system. It is especially simply possible here for known appliances to be used which are known in the form of extruder gums for the application by extrusion of sealing composition or the like. Then it is only necessary to provide that an advancer drive system is attached in place of manual actuation.

In order to prevent destruction of the apparatus after the content of the cartridge is used up, in further development of the invention it is provided that with the piston rod there is associated an end switch which responds to the maximum advance position and intervenes in the advancer drive system.

Since the proximity switch measures the level of the ink bath in the region of the upward swell, addition of ink must be initiated only after the upward swell has developed. For this reason, in advantageous development f the invention, it is provided that the advancer drive control device connected to the proximity swithch is equippped with a timing element which liberates the signal of

the proximity switch only with a time delay after the switching on of the apparatus, for an evaluation. This timing element is expediently set so that the signal of the proximity switch can be evaluated only after a time interval of about 30 seconds, since then the possibility is precluded of ink being supplied if only a short run for example of ten copies is to be produced.

Further features and advantages of the invention appear from the following description of a form of embodiment which is illustrated in the drawing, and from the Sub-Claims.

Figure 1 shows a section through a part of a device in accordance with the invention, in the region of a ductor cylinder of a small offset machine,

Figure 2 shows a partial plan view of Figure 1, and

Figure 3 shows a partially sectional veiw of a quantity-regulating pump pertaining to the device according to Figures 1 and 2.

In Figure 1 a ductor cylinder 1 is shown which rotates in a dish 2 which possesses an oblique inner wall. Ink is charged into a wedge-shaped gap between the oblique inner wall of the dish 2 and the ductor cylinder 1 and forms an ink bath. In the rest position the ink is at the level indicated by the straight dot-and-dash line 3. On the dish 2 there are fitted blades 4 associated with the ductor cylinder, the pressure of which blades against the ductor cylinder 1 can be adjusted by means of a plurality of adjusting screws 5. With the aid of these adjusting screws and the blades 4 it is possible to adjust the quantity of ink entrained by the ductor cylinder 1. The peripheral zone of the ductor cylinder remote from the oblique face of the dish 2 is exposed. An ink-transfer cylinder (not shown) is applied during printing to this peripheral zone.

When the ductor cylinder 1 is driven (rotation direction anti-clockwise in Figure 1), then the ink bath varies its level. It has appeared that by reason of the slight viscosity of the ink an upward swell, indicated by the chain line 6 in Figure 1, forms in the region of the ductor cylinder 1. This upward swell reaches its full size, which thereafter no longer varies, after three to four revolutions of the ductor cylinder 1.

The quantity of ink in the approximately wedge-shaped zone formed by the dish 2 and the ductor cylinder 1 is monitored by means of a capacitive proximity switch 7 which is secured non-displaceably at an exactly set height position on a retaining plate 8. This capacitive proximity switch 7 is connected through an electric lead 9 to a control device, which is not further illustrated.

When an ink shortage is ascertained the control device switches on the quantity-regulating pump as illustrated in Figure 3, which pump conducts the ink by way of distributor conduits 11 to two tubular ink supply nozzles 12 which are directed from above on to the centre of the wedge-shaped space between the dish 2 and the ductor cylinder 1. The two ink supply nozzles lie equidistant from the capacitive proximity switch 7 and their distance from one another corresponds to about half of the length of the ductor cylinder 1. The capacitive proximity switch 7 is arranged above the upward swell 6 approximately in the middle of the duct r cylinder 1, so that the two ink supply nozzles lie approximately at a distance of one quarter of the length of the ductor cylinder from the end of the cylinder.

As quantity-regulating pump there serves an ink-filled synthetic plastics cartridge 10 which is screwed, preferably in the vertical direction, into a distribution piece 13 by a threaded extension 12 having an opening. The cartridge 10 is guided in a sheet metal housing 14 which is laterally open so that the cartridge can be inserted from the side. The cartride possesses a piston 15 which can be advanced step by step, by a predetermined distance each time, by means of a piston rod 16 acting upon it, whereupon the piston rod 16 re-engages in this piston. The displacement of the piston rod 16 is effected through a lever 18 pivotable about a spindle 17, which lever is pivoted up and down in the direction of movement of the piston and in this movement effects a stroke of the piston rod by a predetermined distance. The piston rod is then arrested again. The lever 18 is provided with a spherical head 19 to which an electric drive motor (not shown) is attached with a crank rod. By way of example as electric drive motor there can be used a windscreen wiper motor known *per se*, which is connected so that on a control pulse it carries out one complete revolution and thus effects one complete upward and downward movement of the pivot lever 18, which effects the forward stepping of the piston rod 16 and of the piston 15 by a predetermined distance.

The piston rod 16 and the piston 15 can be advanced step by step until the piston 15 reaches the end of the cartridge 10. In this position the angled-off end of the piston rod, provided with a handle 20 and represented in chain lines in Figure 3, is situated above the end switch 21, which is connected by way of example so that in the position as shown in Figure 3 it maintains the current supply to the drive motor. As soon as the piston rod has reached the position illustrated in chain lines in Figure 3, the end switch 21 opens and interrupts the current supply to the drive motor, so that the latter can no longer be switched on. Then the control device must comprise an indicator which indicates to the operator that the cartridge must be replaced. For this purpose a locking device 22 acting upon the detent system of the piston rod 16 must be actuated, whereupon the piston rod 16 can be retracted into its initial position. Then the empty cartridge 10 must be replaced by a full one, so that then the apparatus is again ready for operation.

As may be seen from Figures 2 and 3, the distributor conduits contain screw connections so that they can be dismantled and if necessary cleaned, relatively simply.

The control device which controls the drive motor (not shown) is connected to the capacitive sensor 7 through the electric lead 9. This control device contains a timing element which ensures that evaluation of the signal of the capacitive sensor 7 always takes place with a time delay. This time delay is selected firstly so that replenishment of printing ink takes place only when the upward swell 6 which

builds up remains so far below the capacitive sensor that this swell then leads to a signal indicating the lack of ink. Moreover the time delay element is set so that it instigates a supply of ink only when the printing mechanism of the offset apparatus is switched on over a period of at least 30 seconds, so that overdosage of printing ink in the case of a short run is reliably precluded.

It is of constructional importance that the utilised capacitive sensor 7, formed as a cylindrical pin, responds substantially only in the case of interval variations which occur in extension of its longitudinal axis, which is directed towards the upward swell 6. Thus it becomes possible to arrange the sensor 7 relatively close beside the ductor cylinder 1, namely at a distance which is less than the possible switching distance between the sensor 7 and the upward swell.

CLAIMS

1. Device for the quantity-regulated supply of ink to a ductor cylinder of an offset printing machine which dips into an ink bath to which there is connected an apparatus for the addition of regulated quantities of ink which is controlled by an apparatus for monitoring the level of the ink bath by means of a distance sensor, characterised in that as distance sensor a capacitive proximity switch (7) is provied.

2. Device according to Claim 1, characterised in that the proximity switch (7) is associated with a region of the ink bath where an upward swell (6) of the ink develops when the ductor cylinder is in rotation.

3. Device according to Claims 1 and 2, characterised in that the proximity switch (7) is arranged centrally between two ink supply nozzles (12) which are arranged at a distance from one another which corresponds at least approximately to half the length of the ductor cylinder (1).

4. Device according to Claim 4, characterised in that the ink supply nozzles (12) are connected through preferably replaceable distributor conduits (11) to a quantity-regulating pump.

5. Device according to Claim 4, characterised in that as quantity-regulating pump there serves a replaceable cartridge (10) which contains a piston (15) which can be advanced step by step, by a predetermined distance each time, by means of an advancer device (16, 18).

6. Device according to Claim 5, characterised in that the advancer device comprises a piston rod (16) which is held by means of a detent device, is connectable with the piston (15) of the cartridge (10) and is connected to an advancer drive system.

7. Device according to Claim 6, characterised in that with the piston rod (16) there is associated an end switch (21) which responds to the maximum advance position and intervenes in the advancer drive.

8. Device according to at least one f Claims 1 to 7, characterised in that the control apparatus of the advancer drive system, which apparatus is connected to the proximity switch (7), is equipped with a timing element which liberates the signal of the proximity switch only with a time delay after the switching on of the apparatus for an evaluation.

8. A device as claimed in Claim 1 substantially as described herein with reference to and as illustrated by the accompanying drawings.

Printed for Her Majesty's Stationery Office by Croydon Printing Company Limited, Croydon Surrey, 1979.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

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308-6097

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No. of Pages including cover sheet: 9

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Pursuant to your request of today's date, attached please find the re-transmission of prior art documentation originally submitted with the response filed on June17, 2003.

Please do not hesitate to contact us, should you require additional documents.

Thank you for your attention to this matter.

/cp